EXECUTIVE SUMMARY

CHAPTER 1
INTRODUCTION

The purpose of this document is to provide planners with a snapshot of the current use of water throughout the Bear River Basin, and a projection of how those uses may change over the next 20 to 50 years. Through the years it is anticipated that social, technologic and economic changes will all have an impact on the basin's water-related issues and concerns. Consequently, the state water-planning process and the basin-planning process have been dynamic in nature and, as such, plans will be re-written as necessary to ensure that the information they contain is current and accurate.

The Bear River Basin has a plentiful water supply and is one of the few areas in the state with a significant amount of developable water. It is anticipated that Bear River water will eventually be developed to satisfy growing needs for areas within and outside the basin. Growth along the Wasatch Front has planners projecting a need to import Bear River water within the next couple of decades. Most communities within the basin have adequate water to meet their projected needs for at least the next twenty years. However, it is possible that industrial, commercial and even agricultural growth could necessitate the development of new sources of water within the basin. Additionally, several communities will need to augment existing supplies within the next decade or two. Regardless of whether the pressure for new water development comes from within or outside of the basin, or whether it results from municipal, industrial, or some other use, a long-term planning effort is needed in the Bear River Basin to assure the use of valuable resource reflects local and statewide concerns.

Hyrum Reservoir at Sunset

CHAPTER 2
WATER SUPPLY

The average annual precipitation for the basin is 22 inches per year. Within the Utah portion of the basin (3,381 square miles) this produces roughly 4 million acre-feet of water. It is estimated that about 60 percent of that is used by the native vegetation and natural systems. The remaining 1,572,000 acre-feet of basin yield manifests itself in surface and subsurface flow working its way toward the Great Salt Lake. Agricultural water depletions (unrecoverable uses) are estimated to be 295,000 acre-feet. Municipal and industrial uses in the basin deplete roughly 21,000 acre-feet. With other minor gains and losses, the estimated total annual average outflow into the Great Salt Lake from the Bear River is 1,200,000 acre-feet.

Assuming full development by Idaho and Wyoming, and taking into consideration current uses and existing water rights, there remains an average annual developable flow of about 250,000 acre-feet for Utah, principally available in the winter and spring. Because of the natural variability of the river's annual flow, the development of a firm yield of 250,000 acre-feet will require new storage. There may be options to develop some of this water through the use of existing reservoirs, but ultimately the development of 250,000 acre-feet will require the construction of a new reservoir(s) and/or other water

development options such as aquifer storage and recovery.

In 1991 the Utah State Legislature passed the Bear River Development Act, directing the Utah Division of Water Resources to develop 220,000 acre-feet of Bear River water. The act allocates 60,000 acre-feet to Bear River Water Conservancy District, 60,000 acre-feet to Cache County, 50,000 acre-feet to Jordan Valley Water Conservancy District, and 50,000 acre-feet to Weber Basin Water Conservancy District. The development approach currently being considered is to: 1) modify the existing operation of Willard Bay by agreement with Weber Basin Water Conservancy District; 2) connect the Bear River with a pipeline and/or canal to Willard Bay from a point near the Interstate 15 crossing of the Bear River near Elwood in Box Elder County; 3) construct conveyance and treatment facilities to deliver water from Willard Bay to the Wasatch Front; and 4) build a dam in the Bear River Basin as the demand for additional water continues to increase.

The State Engineer's office, through its Interim Cache Valley Ground-Water Management Plan will allow an additional 25,000 acre-feet per year of ground water withdrawals in the Cache Valley. As this water is developed, the effect of such development on the hydrologic system will be evaluated to determine if additional withdrawals can be allowed.

Cache Valley

CHAPTER 3
POPULATION AND WATER USE TRENDS AND PROJECTIONS

The Utah portion of the basin has a current population of 136,097 (2000 US Census), which is projected to increase to 203,705 by 2020 and to 297,597 by 2050. This is a total increase of nearly 50 percent or just over 2 percent per year over the next 20 years, and a total increase of 119 percent or approximately 1.6 percent annually over the next 50 years.

With a few exceptions, most industries have shown growth in the past decade. However, manufacturing accounted for nearly half the basin's personal income in 1987, but has dropped to about 40 percent in the past ten years, while the Service, Retail Trade, and Transportation and Utilities sectors now constitute a larger part of the basin's economy. Agriculture and agricultural-related services remain at about four percent of the basin's total economy.

Agricultural use continues to be the major use of water in the Bear River Basin. During the past few decades, heavily populated portions of the state have experienced declining agricultural use corresponding to an increasing municipal and industrial (M&I) use. However, in the Bear River Basin the conversion of agricultural land to urban use has been minimal and has not had a measurable impact upon agricultural water use. The conversion of agricultural land to urban has resulted in a net loss of dry-farm land but not in a loss of irrigated acreage. It is unlikely this trend will be reversed any time soon.

Significant population growth is projected throughout the basin during the next 20 years. However, most of the basin's municipalities have existing water supplies that are sufficient to meet the projected future demand. Despite having adequate water supplies, many towns in the basin will reach or exceed the limits of their reliable system/source capacity within the next 20 years. For many of these towns, water conservation is a reasonable and economic means of postponing the inevitable cost of system improvements by 10 years or more with effective water conservation efforts.

For many communities throughout the basin, the big problem is not actually water supply but some deficiency in their water delivery system. For Logan, Nibley, Paradise, Cornish, Tremonton, North

Garland, and West Corinne the problems exist now. These systems are already operating at the limits of their reliable system/source capacity. For these communities, infrastructure improvements are already needed. For other communities like Lewiston, Millville, Clarkston, Amalga, Smithfield, and Newton, planning efforts now and water conservation strategies implemented over the next 20 years can reduce or delay the need for expensive infrastructure improvements

CHAPTER 4
WATER CONSERVATION

A statewide goal has been established to reduce the 1995 per capita water demand within public community systems by at least 25 percent before 2050. The primary objective and resultant benefit of water conservation is the reduction of water demand, thus allowing existing water supplies to last longer. In addition, water conservation has a number of important secondary benefits. Water conservation can: delay capital investments to upgrade or expand existing water and wastewater facilities; conserve energy as less water needs to be treated, pumped and distributed to the consumer; lessen the leaching of chemicals and sediments into streams and aquifers through improved efficiencies; and reduce stream diversions, enhancing water quality as well as environmental and recreational functions.

The Governor's Water Conservation Team's web site (www.conservewater.utah.gov) is hosted by the Utah Division of Water Resources. This informative web site contains many features that are designed to help Utahns use water inside and outside their homes wisely.

CHAPTER 5
WATER TRANSFERS AND EFFICIENT MANAGEMENT OF DEVELOPED SUPPLIES

The efficient use of existing developed water supplies is an important element in successfully meeting Utah's future water needs. As competition for limited water supplies increases, the value of the existing water supplies also increases. This economic incentive leads to the transfer of water from one use to another. The agriculture industry uses about 94 percent of the presently developed water in the basin. Municipal and industrial (M&I) uses account for the other six percent. Over the next 50 years this ratio is expected to change to an 89 percent to 11 percent split as M&I uses grow.

Most existing M&I systems have sufficient supplies to take them well beyond the year 2020 and many beyond 2050. Where existing supplies are inadequate to address the growth of the next 20 years, there are developable ground water and/or surface water sources. However, the development of surface water sources will likely require storage, making new water expensive. In those cases, agricultural water transfers may prove to be a less expensive alternative when compared to reservoir construction. In Box Elder County, the Bear River Water Conservancy District has acquired agricultural water in the Bothwell Pocket and is converting this water to M&I use over time to meet the growth that is projected within the district.

There is potential for additional agricultural water transfers to account for at least some of the basin's new municipal and industrial water demand, over the next 20 to 50 years. There is also a limited potential for improved agricultural water use efficiency to increase agricultural productivity and improve water quality.

Accurate measurement of water use is essential to proper management and conservation efforts. Most of the basin's community water systems are metered. However, there are properties, such as city parks, golf courses, and cemeteries, which lack meters. Other management tools that could play an

Harvesting Alfalfa in Box Elder County

important role in the future of the basin include water reuse, conjunctive use, aquifer storage and recovery, and cooperative water operating agreements.

CHAPTER 6. WATER DEVELOPMENT

Generally speaking, existing water supplies are adequate throughout the basin for at least the next couple of decades. However, on a micro scale some of the basin's systems are hard pressed, even now, to provide adequate flows during periods of peak demand. Consequently, many local water providers are continually investigating potential system upgrades and, in some cases, additional water development options.

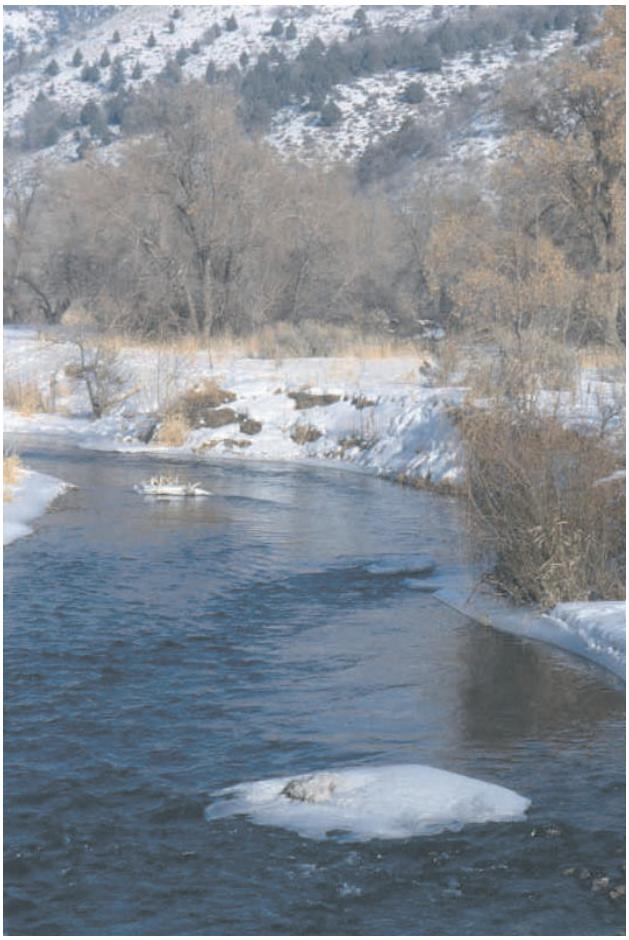
As growth takes place over the next couple of decades, local water suppliers will continue to develop available water sources. In Cache County, this will mean additional ground water development by existing municipal water purveyors. In Box Elder County, where ground water supplies are not so abundant, local water purveyors (primarily Bear River Water Conservancy District) will probably have to be a bit more creative in providing for future water needs. To hold costs down, the district and other water providers will likely continue to acquire existing water rights through the willing buyer/willing seller process and develop whatever ground water supplies might be available.

The Division of Water Resources estimates there are approximately 250,000 acre-feet of Bear River water that can economically be developed. Just how much is actually developed will be a function of many factors. Without a doubt, the biggest deciding factor will be how much reservoir storage is built. Depending upon a number of factors (such as the demand pattern), about 60,000 acre-feet of water can be developed from the Bear River without any new reservoir storage. The next 100,000 acre-feet of developed water will require the construction of storage capacity at a 1-to-1 ratio (or 100,000 acre-feet of storage yields 100,000 acre-feet of water). The next 50,000 acre-feet of storage will yield 25,000 acre-feet of water. After that, every 1,000 acre-feet of yield will require 4,000 acre-feet of storage. Consequently, to develop 250,000 acre-feet of water will require 400,000 acre-feet of storage (about the equivalent of Jordanelle Reservoir). See Figure 13.

In 1991 the Utah Legislature directed the Division of Water Resources to investigate the Honeyville and Barrens reservoir sites. With growing concern about the possible environmental and social impacts of those two reservoir sites, the 2002 Legislature rescinded the directive to consider the Honeyville and Barrens sites, and added a directive for the division to investigate the Washakie site.

CHAPTER 7 WATER QUALITY, THE ENVIRONMENT AND OTHER CONSIDERATIONS

Although there are portions of Box Elder County and West Cache Valley where ground water quality is relatively poor, much of the ground water in the basin is of good quality, and suitable for potable use with little or no treatment. The quality of surface water varies through a wide range due to natural



Blacksmith Fork

effects and human activity. In the upper basin, where the Bear River enters Utah from Wyoming, water quality is considered good. Water temperatures are low, as are TDS (total dissolved solids), alkalinity, hardness and sulfates. The quality deteriorates gradually as the river flows downstream. Return flow from irrigated land, sediment, animal wastes, municipal and industrial wastewater, natural saline springs, agricultural chemicals, and increasing water temperatures all combine to cause water quality problems in the lower basin. In general, each tributary stream shows a similar pattern of downstream deterioration, although some are much better than others.

In the lower Bear River Basin, water quality problems arise primarily from high phosphorus and total suspended sediment concentrations. In particular, dissolved phosphorous contributes to the eutrophication of existing reservoirs. Eutrophication causes diminished recreational and fishery benefits, and the algae produced in a eutrophic reservoir also greatly increase the cost of treatment for municipal use.

Other impacts on fisheries arise when state water quality standards for dissolved oxygen and ammonia are not met. This is especially true in the Spring Creek portion of the Little Bear River drainage. High sediment loads in the Cub River and the mainstream of the Bear River also restrict fisheries. Violations of coliform limits have occurred throughout the basin but were most severe in the Spring Creek subdrainage and indicate a potential public health problem.

The Division of Water Quality is responsible for implementing the Total Maximum Daily Loads (TMDL) program in Utah. In cooperation with other state, federal and local stakeholders the Division of Water Quality has contracted with the Bear River RC&D and the Bear River Water Conservancy District to develop and implement the TMDL program for the Bear River Basin.

Some of the basin's riparian zones adjacent to streams and rivers have been impacted by construction and stream bank modification or channelization as a result of urban growth and agricultural practices. Riparian zones and flood plains need to be preserved and protected because they represent important habitat for wildlife, help improve water quality and buffer the population from flooding.

Historically, impacts to the main stem of the Bear River from urban growth have been relatively insignificant. This is because in the upper portion of the basin above Bear Lake, there are only two small communities directly on the Bear River. A few of the Bear River's tributaries, however, have experienced impacts associated with urban growth and will undoubtedly experience more impacts in the future. Most notable of these is the Logan River, which flows through Logan. Also, the Little Bear River, near Hyrum and Smithfield and Summit Creek near Smithfield represent a potential for urban growth to impact riparian and flood plain corridors. In Box Elder County, growth around Bear River City and Corinne are areas of concern. In these areas it will be important for county and city planners to insure that urban growth does not negatively impact the riparian and flood plain corridors.